Schrödinger's Cat in Resonant Mechanics — A Measurement Without Observers

Abstract

In Resonant Mechanics (RM), the Schrödinger's-cat paradox dissolves. Measurement is not an act of a privileged mind but a boundary acceptance performed continuously by matter itself. Any interface carrying Form (boundary code)—cat, box, air, detector—acts as a phase-selective membrane that accepts or rejects updates of the Field (stored potential) conveyed by Flow (bi-helical transport). In a cat–box assembly, dense couplings and finite corridor quality drive rapid, local recoding of the joint macrostate long before a lid is opened. "Alive and dead" never coexists at the macroscopic level; what persists are microscopic carrier phases until a membrane accepts a specific update. Entanglement appears as matched phase relations, not as suspended macroscopic ambiguity.

1. Framework

Form (boundary code): Infinitesimal interfaces that specify allowed updates (quantized transitions) and stabilize structures.
Field (stored potential): Coiled energy whose helicity bookkeeping supplies carriers (photons for alignment credit, neutrinos for timing discrepancy).
Flow (actuation): Bi-helical, low-shear transport along compression-shaped corridors; total helicity is conserved.
Membranes: Any material boundary (lattice, molecule, detector surface, retina) that gates phase and enforces allowed updates.
Chronotaxy: Local time-order lattice that sets causal speed; acceptance events are causally local.

2. The Cat–Box as a Single Coupled Coherence

The radioactive source, Geiger tube, relay, vial, cat, air, box walls, and table form one coupled system. A decay event launches carrier updates (photons, phonons, charge rearrangements, neutrinos) that traverse membranes and recoding nodes throughout the assembly. Because couplings are abundant and corridor quality (Q) is finite, the system factorizes quickly into a single macro-outcome (cat alive or cat dead).

3. Measurement = Boundary Acceptance (No Special Observer)

In RM, "measurement" is boundary acceptance during a finite window: a membrane absorbs alignment/timing credit and commits a permitted update of the boundary code. No extra "collapse" axiom or conscious observer is required. Humans can observe, but so do aluminum walls, air molecules, nerves, and circuitry—by the same physical rule.

4. Why Macroscopic Superpositions Do Not Persist

1. High coupling density: Many membranes → many acceptance opportunities → rapid code closure.
2. Finite corridor Q: Thermal environments and structural roughness prevent macroscopic, low-shear corridors needed to sustain a live/dead superposition.
3. Mass-locking retunes: Local inertia (phase impedance) adjusts during interactions, favoring stable macrostates that match environmental corridors.
4. No privileged opening: The lid's removal only reveals a macrostate already written by internal acceptances.

5. Wave–Particle Behavior in RM Terms

Propagation (wave): Microscopic carriers travel as distributed phase along least-shear corridors; interference maps the downstream acceptance readiness of membranes.
Detection (particle): A single membrane accepts one update; global alternatives close elsewhere. In the cat setup, the membrane network inside the box performs detection internally.

6. Entanglement and Nonlocal Correlations

Two subsystems can share one distributed boundary code. A local acceptance in the box re-phases the shared code and fixes correlated outcomes externally. No signal exceeds the local causal bound; correlations reflect code closure, not superluminal influence.

7. Dynamics of the Canonical Setup (conceptual timeline)

1. Pre-trigger: Joint system holds a metastable readiness; microscopic carriers explore corridors as phase.
2. Nuclear event: Carriers convey alignment/timing credit into detector membranes; an allowed update is accepted.
3. Amplification: Relay and chemistry propagate accepted updates through successive membranes (mechanical, electrical, biochemical).
4. Macro-fixation: The cat–box assembly irreversibly recodes to one macrostate by dense acceptance across tissues, fluids, and walls.
5. Readout: Opening the lid samples a macrostate already fixed.

8. Experimental Consequences (model-agnostic, qualitative)

Macroscopic interference suppression: Any attempt to sustain a macroscopic superposition must unrealistically remove membranes and raise corridor Q.
Pointer states: Stable macrostates align with environmental corridors (e.g., definite positions or biochemical outcomes).
Delayed-choice analogs: Post-selection alters which carriers register but does not retro-create a live/dead cat; macrostates are fixed by earlier acceptances.

9. Relation to Standard Interpretations

Copenhagen: RM replaces an undefined “collapse” with membrane acceptance governed by boundary code.
Decoherence: RM recovers environmental decoherence as the cumulative effect of many membrane acceptances; no extra axiom is needed.
Many-Worlds: RM does not require branching macroscopic worlds; it requires only that one boundary code be accepted locally.

10. What Counts as an Observer

Anything with a boundary that carries Form acts as an observer. The cat observes the detector; the detector observes the decay; the air observes the cat; the box observes all of them. Human awareness is late-stage readout, not the origin of definiteness.

11. Testable Heuristics

Scale law: Decoherence time drops with membrane count and coupling strength; grows only under extreme isolation and cooling.
Corridor engineering: Increasing corridor Q (ultraclean cavities, cryogenic optomechanics) extends coherence for small systems; scaling this to organisms is infeasible because membranes multiply with size.
Non-demolition windows: Weak, phase-compatible probes can delay acceptance for micro-systems; not for macroscopic, warm assemblies.

Conclusion

In Resonant Mechanics, the cat paradox is a category error. The cat–box assembly is not a passive stage awaiting a mind; it is a network of observing membranes that continuously accepts or rejects updates. Dense couplings and finite corridor quality ensure that a single macroscopic outcome is written internally and rapidly. Opening the lid does not decide the cat’s fate—it merely reads what the coupled system has already and lawfully written.